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Vol. VIII. No. 3

STORAGE

January, 1915

TRANSACTIONS

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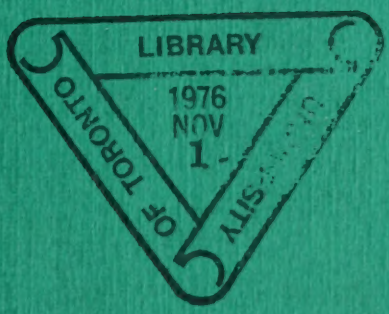
OF THE

SOCIETY OF TROPICAL MEDICINE AND HYGIENE



London:
SOCIETY OF TROPICAL MEDICINE AND HYGIENE
11 CHANDOS STREET, CAVENDISH SQUARE, W.

TRANSACTIONS

OF THE

SOCIETY OF TROPICAL MEDICINE AND HYGIENE.

JANUARY, 1915.

VOLUME VIII. No. 3.

Proceedings of a Meeting of the Society on Friday, December 18th, 1914,

Dr. F. M. SANDWITH, F.R.C.P., *Vice-President*, in the Chair.

TROPICAL PROBLEMS IN THE NEW WORLD.

BY

ANDREW BALFOUR, C.M.G., M.D.

To anyone gifted with what we may call the "sanitary eye" the most interesting notice on board a Royal Mail steamer bound for West Indian and South American ports, is one which is to be observed in the closet compartments, and which is printed in Spanish and in English.

"Please do not throw paper on the floor," is the injunction. To the uninitiated this suggests a laudable desire for tidiness. Its real significance is not apparent until one embarks upon a South American river steamer, or penetrates into Venezuela or Colombia; but of this anon.

We will begin with Barbados, a tight and loyal little island, the outpost of our Empire in the West. There is nothing very tropical about Barbados, when viewed from a steamer in the roads. Save for a fringe of Casuarina trees, resembling Parkinsonias, and an occasional palm, one might be gazing at a bit of southern England transported to the Caribbean Sea; but as soon as one nears the shore this illusion is dispelled, for the coral formation is apparent, together with other features inseparable from hot climates. Still employing the "sanitary eye"—a very useful asset in such journeyings, and one as a rule more agreeable

to use than the "sanitary nose"—we observe the large number of small craft, mostly schooners, tied up alongside the wharves, and lying in the careenage. We enquire whence they come, and we are told that they hail from the neighbouring islands, British Guiana, and the Orinoco. At once we are confronted by an interesting problem. Locally acquired malaria is unknown in Barbados, for the simple reason that anophelines are not present in the island. Why are they not in evidence? Granting for the moment that there are no suitable breeding places for them, or that natural enemies abound and prevent them propagating themselves, how comes it that they are not introduced by these small craft, hailing from regions where they are common and very often infected with the malarial parasite?

It is true that the anopheline is not nearly so good a traveller or seafarer as the hardy stegomyia, but still we know that he, or rather she, can be carried long distances on steamers, as, for example, from Bombay to Trieste, and occasionally from the Southern Nile to the desert areas of the Sudan.

I questioned Dr. BRIDGER, the able and energetic Port Health Officer of Bridgetown, on this matter. He told me that he had searched the vessels for them, but had never been successful in finding them. In a letter which he sent me some time ago, he says:—

> "I have myself often wondered that mosquitoes do not find their way here on these craft; but have never yet discovered one, though I have looked for them both before and since you referred to the matter. We have about half-a-dozen white men—natives of Saba—who are masters, and usually owners, of these craft, and I have discussed with them this question. They tell me that lying alongside the wharves in British Guiana (Georgetown), mosquitoes come on board in large numbers—probably many anophelines among them, for malaria is quite common there—but on getting to sea they disappear entirely, as a result, in their opinion, of the strong breeze blowing them away. Barbados is to windward of all the neighbouring malarious ports, and therefore sailing vessels have to "beat," as it is called. Making these several tacks they would get swept by the wind first on one side and then on the other.
>
> It is conceivable that every mosquito on deck or in the living

compartments, which are only deck houses, could be swept away, as they are very fragile. As to those which may be concealed in the hold, we must conclude that the tight battening of the hatches, for not less than thirty-six hours, must be sufficient to kill them."

It may be so, it probably is so, but I would like to see a few ideal breeding places artificially constructed in close proximity to the wharves. It would be very interesting to observe what such a kind of trapping produced. I suggested this manœuvre, but was told that it would immediately result in a campaign of calumny, and that any hapless medical man who tried it would run the risk of being accused of enticing deadly insects to the island!

Barbados is justly proud of a fine conservatism, but it may be and is carried too far in sanitary matters.

Let us go a step further in our malarial enquiries, and at the same time a step back. The first will bring us to a consideration of possible anopheline breeding places in Barbados, the latter will refer us to the statements made by Dr. MALCOM WATSON in this very room a twelvemonth ago, and the remarks of Dr. LOW thereupon. Dr. WATSON declared that the absence of breeding places was due to the porosity of the coral limestone of which Barbados is composed. Dr. LOW stated that such a conclusion was not justifiable, and cited the presence of permanent water collections near Worthing. That Dr. LOW was correct is apparent from the photographs I was able to take, shewing the extensive Hastings swamp with its accompanying canals, and also certain pools which look ideal for anopheline breeding operations, a photo of which is given here *(Plate 1, fig. 1)*. On at least one estate there is also a large pond which might very well play the part of a mosquito nursery. Both Drs. WATSON and LOW agreed that the presence of the famous Barbados "millions" cannot be the sole cause of the absence of eggs, larvæ and pupæ, and Dr. LOW has shewn that, so far as the Hastings swamp is concerned, there is nothing in the chemical constitution of the water adverse to mosquito life. I brought some of the "millions" home, and had them named at the British Museum. They are not *Girardinus pœcilloides*, but *Lebistes reticulatus*, a point worth noting. I shew you some specimens.

Are there any other enemies which may play a part? In the pond

aforesaid there were ducks, and these might certainly be effective, while the swamp is actually maintained as a shooting ground. It attracts flocks of migrating birds, and these would probably play havoc with mosquito larvæ, but only at certain times of the year. In my search I came across another enemy, very abundant and very voracious, which seems to have been overlooked. This is the little back-swimmer, belonging to the genus *Notonecta*, which, by means of its active movements and its silvery belly, is easily recognised. It might well be named an aquaplane, for when speeding through the water it closely resembles an aeroplane upon the wing. WILLCOCKS, of Cairo, was the first to draw attention to the larvivorous habits of these useful insects. I tested them at Khartoum and was interested in coming across them again. The indefatigable Dr. HUTSON being with me, I pointed them out to him, and he told me that he had been puzzled by one water collection which contained no "millions," only these *Notonectidæ*, and though in every other respect suitable for culex or stegomyia larvæ, was quite mosquito free. He had suspected the back-swimmers, but was told they were inoperative. We soon found the contrary, and spent a profitable Sunday afternoon watching them fasten on culex and stegomyia larvæ, which they grip as a spaniel grips a rabbit, and then engulf, tail first. When you convey these back-swimmers from their native haunts in a vessel or jar you have to be careful that the latter is covered, for these curious creatures have a habit of reaching the surface, rapidly drying their wings, and flying forth. As I was journeying in the mule train from Hastings to Bridgetown, one of my specimens played me this trick. It is known that these *Notonectidæ* sally forth from their pools at night and seek fresh hunting grounds.

Now I am far from saying that the recognition of larvivorous *Notonectidæ* in Barbados solves the mosquito problem there, but they may certainly play a part in keeping pools and swampy areas free from larvæ. It would be well worth someone's time to investigate the question thoroughly.

Dr. SAMBON tells me that in the rugged northern part, known as Scotland, where, at certain seasons of the year, there are running streams, the presence of natural oil may be the reason for the absence not only of the water stages of the mosquito, but of all aquatic life in these temporary rivulets. I am unable to express an opinion on this

view, as I only gazed upon St. Andrew's parish from one of the highest elevations in the island. I got there through the kindness of Dr. HUTSON, who has done so much for the island from a sanitary standpoint, and who pursues the wily stegomyia with an ardour which deserves success. Is it not, however, a disgrace that in a little island like Barbados, where there are few natural breeding places, stegomyia and culex still flourish exceedingly? Given full powers and adequate assistance, more especially in the direction of trained British Sanitary Inspectors of the right type, I believe that Dr. HUTSON, or any other energetic and tactful Health Officer, could clear Barbados of harmful mosquitoes within a year; that is to say, he could reduce them in numbers till they were no longer a potential or actual source of danger to the community.

On the contrary, what do we find? Despite the great advantages accruing from a pipe-borne water supply, despite Dr. LOW'S and Professor BOYCE'S campaigns, despite tales of comparatively recent local outbreaks such as that in 1908, despite the presence of the well-known Yellow Fever House, despite Dr. HUTSON'S work, stegomyia are still busy breeding in barrels, tanks and other convenient places provided by the negro smallholder, and too often also by the European. The inhabitants, if ever they think about the matter at all, rely on their Port Health Officer. They might do worse, but they might certainly do a great deal better, and meanwhile are contented to be pestered and bitten by a voracious blood-sucker.

Conditions are even worse when we consider the culex mosquitoes. These abound in some parts and, sad to say, filariasis is far from uncommon, and so elephantiasis is to the fore. Indeed, Barbados is acquiring an evil reputation, and the phrase "Barbados leg" is coming into use. Is it fair or right that young and otherwise healthy people should be afflicted with an easily preventable disease like elephantiasis? Is there any rhyme or reason for tolerating a state of things where possibly, through no fault of their owners, a man's scrotum may eventually reach his knees, or a woman's graceful leg and foot attain huge and hideous proportions? In some countries the difficulties of getting rid of the mosquito carrier of filaria are well-nigh insuperable, but this is not the case in Barbados, and it is amazing at this time of day to see the lethargy and indifference with

which the mosquito question is treated; and it is both amazing and disheartening to be told of the opposition which Dr. HUTSON'S diligent efforts encounter.

There is only one way of dealing with this kind of thing, and that is what we may call the punitive method. Offenders must be fined—tactfully fined, but well fined—until they learn that it is better to keep an eye on their water receptacles than to be frequently called upon to pay a penalty. The system is in force in Barbados, but organisation is lacking. Full powers must be accorded the Health Officer, who should be well paid and devote all his time to sanitary work. He must be given a sufficient and efficient staff. It is absurd that a man of Dr. HUTSON'S years and standing should have to go wandering about amongst negro cabins, dipping cups and calabashes into barrels, and wearing himself out in duties which could be performed by a young and trained assistant, thus setting free his chief for grappling with some of the other problems which Barbados presents.

There are many such. I might speak of the "Poor Whites" of whom we heard when our PRESIDENT delivered his inaugural address, but I will keep them until we get to Grenada. The guinea-fowl in Africa is a pathological museum. The blood of those I examined in Barbados shewed no hæmatozoa. Neither did the blood of some captive migratory birds, but, for all that, an interesting piece of work would be to determine the blood parasites of the wild and domesticated creatures of the island. It has never been done, but it should be done, and I think Dr. JOHNSON, Director of the Laboratory, is the man to do it. He is keen and has a very fair equipment, but he needs assistance and a larger annual contingent. At present he has too much other work to do. Still, there is hope in that direction.

The Barbadian leper would form an interesting subject of study. Why did pigs, which were once kept at the leper asylum, develop a curious disease, associated with skin lesions, when fed, *horribile dictu*, on the old poultices and dressings? This economical practice is no longer in force, but it appears that an opportunity for research was lost. At the same time, the rats there are affected with what may be rat leprosy, so a part of the field is still open to the anxious enquirer! Why does pellagra flourish when there are no *Simuliidæ?*

Do *Ceratopogoninæ* play a part, or are insects operative at all? What is the best way of dealing with crab holes, the breeding places of *Deinocerites?*

However, I must not let Barbados detain us any longer, so we will away to a very different type of island, a veritable pearl of the Antilles, the green and picturesque Grenada. But though Grenada differs in many respects from Barbados, I regret to say that they have at least one thing in common, and that is the prevalence of *Ædes calopus*, as *Stegomyia fasciata* has been renamed by KNAB. St. George's is full of this annoying insect, and again we ask, why? If Barbados is somewhere about the base of the yellow fever volcano, St. George's is perilously near the brink of its crater, for it is more liable to be invaded by that disease. I was told that "a certain amount was being done." Any sanitarian knows what that means. It is a hygienic opiate which stills the conscience of officials and lulls the populace into a false sense of security. There is no use mincing words when dealing with these matters. Questions concerning life and health are, or should be, too important to be relegated to the domain of fair speech and suave excuses. The mailed fist and not the gloved hand is required when dealing with grave faults in tropical sanitation, but what with lethargy, inertia and vested interests, even the mailed fist finds it difficult to accomplish the work, and it must in any case be wielded with due tact and discretion. I speak feelingly, for I was devoured by stegomyia—the mosquito curtains being wrongly hung upon an old four-poster bed. My only satisfaction was that, like MOWGLI, I enjoyed much good hunting aided by an electric torch.

I received the same kind hospitality in Grenada as in Barbados, and hence was able to see some interesting cases. Amongst other places visited was the colony of "Poor Whites" at Mount Moritz. Canon WALTON, who takes a keen interest in these poor people, and is also alive to the claims of hygiene in the tropics, accompanied me. These settlers—some 200 in number—came from Barbados forty years ago. I need not tell you who they were originally, or how they have kept to themselves. In Barbados I had seen some of the children lying ill with enteric in St. John's parish. Beautiful children certain of them were, their fine features telling of good blood and an

ancestry at one time of high degree. I found similar boys and girls in Grenada, for the most part sturdy, well-nourished, good-looking, though pale, and fairly alert *(fig. 2)*. But there were notable exceptions. Where the deadly ankylostome had fastened there was evidence of anæmia and degeneration. I shew you a small boy with the typical facies *(fig. 3)*, the youthful victim of severe hook-worm disease. It was the same tale throughout. So long as these children escape ankylostome and malaria infection, there is not much wrong with them, and both mentally and physically they at least approach children of their age in temperate climates. It was another story with the adults. These unfortunate people, some, remember, with traces of blue blood in their veins, are termed "Red Legs," and are looked down upon by the prosperous negro. Amongst them I only noticed one who could be called a good type of manhood. He was rather a fine fellow, who had recently returned from Panama, and who, I think, would have compared favourably with the average European labourer of his age and race. Poverty, venereal diseases and drink play havoc with the "Poor Whites," and, of course, some are suffering from the effects of ankylostomiasis and chronic malaria. In Barbados there is not, as I once thought, "a fair field and no favour" for judging the question of the adaptability of the white race for prolonged residence in the tropics. Malaria, it is true, is absent, but ankylostomiasis is common and is specially prevalent amongst the "Poor Whites" of that colony. It is a pity something cannot be done for the children. They attend school, recite Dr. BRANCH'S "Health Catechism" in a parrot-like fashion, unaided by pictures or diagrams, and some of them shew promise. Here is an opportunity for a wealthy philanthropist to save the offspring of the "Poor Whites," and give them a fair chance in life! Considering the ancestry of some of them there is no saying what surprises such a scheme might produce. One certainly feels that—

> **"Some mute, inglorious Milton here may rest,**
> **Some Cromwell guiltless of his country's blood."**

The question of the "Poor Whites" leads us to the larger question of the White Race in the Tropics. Some new facts have accumulated and some fresh statements have been made since the problem was last considered by this Society. For example, CHAMBERLAIN has recorded the results of his investigations in the Philippines, both as regards the

physiological activity of Americans in these islands and the influence of tropical residence on the blood. His conclusions will surprise some of you and please others, for, as regards the first subject, he says :—

1. It seems probable that climate *per se* exercises little if any harmful influence on Americans in the Philippines.

2. By far the larger part of the morbidity and mortality in the Philippines is due to nostalgia, isolation, tedium, venereal disease, alcoholic excess, and especially to infections with various parasites.

3. The facts justify the hope that the progress of tropical sanitation may ultimately permit the permanent colonization of certain parts of the tropics.

Has the American occupation of the Philippines lasted long enough to justify these views? Will the results apply equally well to the protected and healthy offspring of Americans wholly reared in the Philippines? I cannot say, but we find similar opinions expressed by the Administrator of the Northern Territory of Australia, and by Drs. HOWSON, HOLMES and MAPLESTONE, while so great an authority as Surgeon-General GORGAS is also in accord. Moreover, here is an interesting note which I came across in the *Indian Medical Gazette* for November :—

"The possibility of a Northern European race acclimatizing itself in the tropics is one of vast importance, and especially to the inhabitants of Australia, as so much of the northern portion of that island continent is within the tropics.

"Theories are many and facts are few, therefore it is worth while here giving some details of a genuine example of an unintended experiment in this direction as narrated by Mr. J. Macmillan Brown in his recent book, *The Dutch East* (Kegan, Paul & Co., 1914).

"The story is briefly as follows :—In 1665, eight Dutch soldiers were sent by the Netherlands East India Company to the little island of Kissa, sixteen miles off the most easterly point of Timor; a fort was built and they were told to watch the Portuguese. The Company forgot all about this lonely outpost, and Sergeant Kaffyn and his men realised that they were in fact marooned. They had their wives with them; a guiding principle of the Dutch East India Company. They set to work to build houses and cultivate the land. The descendants of these eight couples still remain. They have been wonderfully fertile; in the

two and a half centuries the 16 have risen to 300, and they are a sturdy race with no signs of any evil effects from interbreeding. They still keep their blood pure and still have big families, and many have fair European faces and complexions and many children have light hair and blue eyes. These people had to work, and work hard, and the consequence is that after 250 years in this tropical island they are still fertile, indeed prolific, and still keep their North Europe characteristics."

As regards blood changes, I had an idea that possibly the pallor of Europeans long resident in the tropics, and that of the healthy "Poor Whites," was due to a certain grade of anæmia which was really a physiological and prophylactic change. The plethoric man does not usually find tropical conditions to his liking, and I fancied that Nature might possibly aid the Caucasian to withstand adverse conditions by slightly altering his blood state. If CHAMBERLAIN is correct, this hypothesis is not valid, for in his paper on "The Influence of Tropical Residence on the Blood" he tells us that his observations shewed that examination of white men after a year or more of residence in the tropics gives an average erythrocyte count well above 5,000,000, a hæmoglobin percentage between 88 and 90, and a colour index ranging from 0·82 to 0·88. For Filipinos the average hæmoglobin estimations were 93 per cent. These figures do not indicate an impoverished condition of the blood. The expression "tropical anæmia" is often found in the earlier treatises on the diseases of hot countries, and is still heard not infrequently. It is his belief that such a condition, *due to the effect of climate per se*, does not exist. More recent investigations have shewn that much of the anæmia formerly classed as "tropical" was in reality secondary to infections with plasmodia, uncinaria and leishmania.

It would seem, as MUSGRAVE and SISSON maintain, that the pallor of the skin is merely due to a local vasomotor condition, a cutaneous ischæmia.

Considerations for space forbid further reference to this interesting question, and indeed Grenada itself cannot claim much more attention. Malaria exists in its river valleys, but in Dr. COCKIN'S absence I was unable to get accurate information as to the type chiefly in evidence. Endemic filariasis, as Dr. LOW has noted, an observation confirmed by Dr. COCKIN, is exceedingly rare. Why should this be so? Ankylostomiasis is rampant, but has now happily been taken in hand,

and we may look for better things. It is at first strange to find that amongst the negro population tuberculosis, and more especially phthisis, ranks first as a dealer of death. A little familiarity with the conditions of life soon makes it clear why this is the case. The negro lives in a world peopled by Jumbis and malevolent spirits. These are especially to be dreaded at night, and consequently every crack and cranny of the cabin is closed against them. Overcrowding, bad ventilation, and a natural proclivity of the negro to the disease it induces give the *Bacillus tuberculosis* every opportunity. Grenada, however, has risen to the occasion. Thanks chiefly to Dr. HATTON, a tuberculosis hospital, of which I shew you pictures *(fig. 4)*, is in full swing. Few hospitals in the world can command such a site and such a view as this little sanatorium.

I visited the town of Gouyave, where I met an old Edinburgh man, Dr. O'NEALE, took some photographs of sanitary interest *(fig. 5)*, and saw a very curious case of what was stated to be pinta in a coolie woman. Dr. SAMBON had seen this case when he visited the island, and I shew you a photograph he took of it *(Plate 2, fig. 6)*. I doubt very much if the condition had anything to do with pinta. The white skin was so healthy and elastic that I began to wonder if the so-called coolie had not once been a European who had been stained. I cannot say, but it is certainly a very remarkable case of depigmentation. Albinism amongst the negroes is not very uncommon. Here is a photograph of what we may call a piebald family *(fig. 7)*. Dr. MITCHELL, of St. George's, kindly gave me the print. In Grenada, as elsewhere, there is a large ant with urine-loving propensities. Its possible rôle as a disease carrier must not be overlooked.

A word as to the south end of the island, where there is a spot once an indigo plantation and so known as "True Blue." There the conditions are wonderfully African in type, as I am able to demonstrate, and enormous centipedes can be found, as witness the monster in the bottle. One would fain linger on Grenada as one was fain to linger in it, but the fact that from its southern extremity the distant northern mountain ranges of Iere—the land of the humming bird—can, in very clear weather be descried, brings Trinidad and its problems into mind, so we will journey to the Gulf of Paria and Port of Spain.

I landed in the latter over twenty years ago, in August, 1893, to be exact, and though in those far-off days I had not fully acquired the "sanitary eye," I think I can say that I was blessed with an enquiring one.

Hence I can testify to the great change which has taken place in that capital, a sanitary revolution due largely to the labours of Surgeon-General CLARE and some of his staff, notably Dr. DICKSON *(fig. 8)*. It has not been an easy task, but already the results are in evidence, and if the same principles can be applied to the colony as a whole, Trinidad will have every reason to esteem itself a fortunate isle.

There is much I might say about this, our most important West Indian possession, for, in the stimulating company of Mr. URICH, the Government Entomologist, I ranged far and wide; collected diseased Simulium larvæ in the beautiful verdant vale near Arima, where the Madre de Cacao, the glorious Bois Immortel, spreads its vivid scarlet flower clusters against a sky of purest sapphire; witnessed the Atlantic combers bursting in snowy foam upon the long beach line of the wind-swept Cocal with the so-called "four-eyes" spluttering in the back-wash and defying capture; plunged into the mysterious High Woods and was thrilled and awed, as was Kingsley long ago; looked once more upon the Pitch Lake, now shorn of much of its weird beauty, thanks to clearing operations following "Yellow Jack"; visited the Leper Asylum and noted the noble devotion of the French Catholic Sisters; saw Dr. SEHEULT at work in the Colonial Hospital; and spent days prowling round cow sheds, opium dens, latrines and public urinals with Dr. DICKSON, realising to the full the truth of these words—

> "Where every prospect pleases
> And only man is vile."

One is dealing with problems, however, not with prospects, so let me direct your attention to those which are, perhaps, the most interesting.

1. Why has kala-azar never been found in Trinidad, or, for that matter, in Jamaica? For many years a stream of East Indians, some of them from leishmaniasis areas, has been pouring into both these colonies. It is surely reasonable to suppose that amongst all these thousands of coolies some, when they left India, were in the incubation period of kala-azar, or were even in an early stage of the disease! Yet kala-azar has not been found. Dr. DICKSON tells me he has been on the lookout for it, but has never come across *Leishmania donovani*. Is not this curious? It is true that in the New World generally this parasite does not seem to have gained a footing. Only one case of infection is

recorded in the literature, that at Manaos on the Amazon, and it does not seem to have been introduced.

Is observation at fault, or is the insect-carrier absent? Personally, I am inclined to think the disease must be present and has not been recognised, but I saw nothing of it either in Trinidad or Jamaica, though, of course, my investigations were very limited.

2. There is a big scheme afoot for planting bamboo, as a source of paper pulp, on a large scale in Trinidad. How will this affect the malaria question there? Cut bamboos, unless severed at the nodes, leave ideal breeding places for anophelines. The hollow stem can, of course, be plugged with tar, but that would be a heavy task. Might something be done by having a cleared area round the plantation, and dotting trap-breeding pools here and there? This is at least worth thinking about.

3. Plague runs as an epizootic in rats. Can yellow fever exist as an epizootic in monkeys, and especially howler monkeys? I have already considered the possible relationship of the indigenous monkeys of South America to obscure outbreaks of this disease, and Dr. Low has replied to my hypothesis. With most of what he says I am in entire agreement, but I think that in his letter he tended to overlook the point on which I wished to lay special stress. This being so, it is perhaps better to discuss the matter at some length, as, since writing my note to *The Lancet*, I have obtained some further information of considerable interest. On my way to the West Indies, I was told by a lady, Mrs. Randolph Rust, who has been long resident in Trinidad, that the old negroes there say they can always tell when there is going to be an epidemic of yellow fever in the island owing to the fact that, prior to its appearance, the red howler monkeys are found dying and dead in the High Woods. In view of Manson's injunction to search for a reservoir of the virus amongst some of the lower animals, this negro statement struck me as curious and interesting, though naturally one did not place overmuch credence in it.

When I reached Port of Spain this monkey question assumed fresh interest. Dr. Clare gave me particulars about a recent small outbreak of yellow fever at Brighton, the port for the Pitch Lake in the south-west of Trinidad. Briefly this is what happened:—

One of the American engineers engaged in oil-boring operations

arrived in Trinidad from Guanaco, on the Venezuelan mainland, five days before being attacked with yellow fever, of which he died on the fifth day of his illness. He was struck down six days after leaving Guanaco, and Dr. CLARE told us that for the last twenty-five years for which records are available no case of yellow fever is known to have occurred at that place. In my opinion this does not, of course, wholly exclude an infection acquired at Guanaco, or upon the steamer in which he travelled, although in any case the incubation period would be lengthy, but Dr. CLARE was convinced that it had not been so acquired. Mark, however, what followed. This man was employed at a spot eight miles in the heart of the dense virgin forest, at the end of a road which had recently been constructed through the leafy wilderness. In this locality red howler monkeys are known to occur. Associated in work with this man was another who had not been out of Trinidad for more than eighteen months. This second man was also struck down with yellow fever on the same day and almost at the same hour as the first case. He eventually recovered. As Dr. LOW admits, it is not easy to account for infection in this case, provided the medical enquiry was adequate, which, speaking from memory, I believe to have been the case. The other cases, eight in number, two of which proved fatal, need not be considered. They are all explicable by the ordinary man to mosquito, and mosquito to man infection.

Dr. GEORGE, who carefully investigated the outbreak, attributed it to some unknown cause in the oilfields amongst the forest.

Upon enquiry I found that several people knew all about the negro belief of which I have spoken. Mr. RUST got hold of his chief hunter, who confirmed the negro statement in every particular, and said that before the last large epidemic of yellow fever in Trinidad the red howlers were found dying and dead in large numbers. Further confirmation was forthcoming from Mr. F. W. URICH, entomologist to the Board of Agriculture, an acute and trained observer, who told me that he himself had seen the monkeys lying dead, and at the time thought they had probably perished from the effects of a protozoal blood parasite. He had not, however, specially associated this mortality with the subsequent outbreak of yellow fever.

A point of possible interest is that in these High Woods a species of

wild stegomyia, called *Ædes sexlineata* exists. It is very like the known yellow fever carrier.

The two men first and well-nigh simultaneously attacked were working on an oil well at the end of the new asphalted motor road already mentioned. They spent ten hours a day on the oil fields, going there every morning from Brighton and returning every evening. In this connection it is well to remember that *S. fasciata* bites by day as well as by night. In water collections at a bungalow which stood in the clearing at the end of the road, Dr. GEORGE found *S. fasciata* breeding when he visited the place *(fig. 9)*. As I have said, monkeys occur at this spot, but there was nothing to shew that they had been sick or dying.

Granting that the first case got infected in Venezuela, although there is no evidence to that effect, how are we to explain the second case?

It may be affirmed the disease was not yellow fever. In reply I can only say that both cases were typical, with jaundice and albuminuria, and that the diagnosis was confirmed post mortem in the first case, and also in subsequent cases. Could the man first attacked have conveyed an infected mosquito ashore in his baggage? This is not a very probable contingency but cannot be altogether excluded.

Was yellow fever present in a mild and unrecognised form amongst the coloured employees of the American company, or amongst the negro population? Careful enquiries were made by Drs. GEORGE and CAMPBELL, who decided that such was not the case. Let it, however, not be forgotten that some medical men maintain that yellow fever is endemic in Trinidad. Of this, I believe, there is absolutely no proof, albeit it is not an easy thing to disprove.

There remains the hypothesis I have advanced. Needless to say I do not wish to urge that the monkey, or indeed any of the lower animals, is an *essential* factor in the spread of yellow fever, but I suggest that certain obscure outbreaks like that in Trinidad may possibly be explained on such an assumption, and I submit that it is at least very desirable that the liability or otherwise of the indigenous monkeys of South America to yellow fever infection should be ascertained. Dr. AGRAMONTE, of Cuba, with whom I discussed the matter, agreed with me on this point, and it must be remembered that his unsuccessful inoculations were carried out upon Rhesus monkeys, originally natives of India.

As I said before, there may be nothing in the idea, but I am told that in certain parts of Brazil a mortality in monkeys is known to accompany yellow fever outbreaks, and certain isolated epidemics in Colombia could be explained on such an hypothesis. The wild monkey and man rarely come into close contact, but they do so now and again, as possibly in the High Woods of Trinidad, and opportunities for infection might occur.

When yellow fever raged at Gibraltar, in 1828, the monkeys, probably an African species, died in large numbers, but of course mortality amongst other animals has been noted in yellow fever outbreaks.

Still, it is an interesting fact that the distribution of the genus Alouatta, of which *A. seniculus* is the red howler, corresponds in South and Central America fairly closely to the known distribution of endemic yellow fever. It may be a mere coincidence, but at least it would justify the experimental work I have suggested.

We know so little about some phases of yellow fever that anything which might throw fresh light upon it would undoubtedly be welcome, and if one is careful not to change hypothesis to fact, no great harm can be done, and in some instances benefit may accrue.

As we are talking about yellow fever, I may say that I have been wondering if, during its epidemic prevalence, the employment of blood tubes, like those with which RODHAIN fed his captive tsetse flies, might prove useful. If stegomyia were found to feed on them greedily, there might be a smaller number of human beings bitten and hence a lessened chance of infection.

Any such scheme would have to be combined with vigorous anti-larval measures, for the provision of blood-feeds would probably tend to increase breeding operations.

The voyage from Port of Spain to Ciudad Bolivar on the Orinoco, was made on the Venezuelan river steamer "Delta." It was then that I appreciated the real reason for the notices on the Royal Mail boats, with a reference to which I commenced this paper. All through Venezuela and Colombia one finds the disgusting and dangerous habit in vogue of throwing used toilet paper on the floor or into a small wooden box on the floor, and not into the pan of the water-closet. The subject is not a pleasant one, but I make no apology for

mentioning it, for, apart from anything else, each of these countries is, like Egypt, a land of flies. In each enteric fever is prevalent, as are diarrhœal diseases generally. Is it any wonder? The custom is by no means confined to the lower orders. One finds it practised in better-class hotels, though, of course, not by educated Venezuelans or Colombians who have travelled in the United States or Europe. I enquired how this peculiar habit had originated. It appears that the earlier types of water-closet used in these countries had very imperfect flushing mechanisms and constantly gave trouble. Distrust was thus engendered, and so it is the plumber or the engineer who was originally to blame. It is not the first time that these gentlemen have upset the sanitary apple cart!

I wish I had time to describe the delta of the Orinoco as I viewed it from the Macareo Channel, and thought of Raleigh and his sweating seamen, labouring in their clumsy boats against the mighty current. Mansonias and sundry Tabanidæ boarded us, together with the little green and vicious Lepidoselaga, which I was to meet and feel later both on the Magdalena and the Atrato.

At daybreak one morning I saw a family of capybaras emerge from the forest, but looked in vain for jaguars and anacondas, though the jaguar is sometimes seen in the delta, where it is common. I mention the capybaras especially, because it would seem that in certain parts of Venezuela they may act as reservoirs for the parasites of "Renguera," a trypanosomiasis of equines. At any rate, it is known that before outbreaks of this disease in horses, capybaras, agutis, aguchis, and pacas, all water-loving rodents, die in large numbers. If this supposition is correct these animals form a different kind of reservoir to the big game of Africa, which do not suffer from the infection. The condition must be more like what is met with in rats before plague epidemics.

The scenery of the Orinoco changes completely once the delta is left behind. The shores are sandy and rocky, with low hills in the background covered with bush or sparse forest. At the famous narrows, called Angostura, 236 miles from the river's mouth, one reaches Ciudad Bolivar, the capital of the large state of that name. It was formerly known as Angostura, and gave its name to the popular bitters now manufactured in Trinidad.

Ciudad Bolivar is a city set on a hill, which cannot be hid, a

picturesque spot, with much of interest for the tropical hygienist *(Plate 3, fig. 10)*. The Hospital Ruiz is the centre of its medical life, and here I found Dr. FELIX PAEZ busy with his microscope and upholding the torch of tropical medicine in this somewhat remote part of the world. To him and to his colleagues, as well as to the courteous Government officials, I would take an opportunity of expressing my thanks and gratitude for much kind hospitality and assistance.

One of the problems for the sanitarian, and especially for the sanitary engineer, is how to get rid of the large lagoon which at certain seasons of the year is present on the low-lying land to the east of the town, and also how to carry the surface drainage to the river. Part of it runs on to this low-lying land, forming dirty and swampy areas where pigs love to wallow, and where vultures pick up a living.

With very little trouble, and at a comparatively small cost, Ciudad Bolivar might be made a very healthy place. At present it has a death-rate of something like 23 per 1,000, its population being about 20,000.

Another problem I encountered was concerned with the diagnosis of a peculiar disease of the nose. It did not seem to be leprosy, or lupus, or syphilis, or espundia, or gangosa. I do not know what it was, but it may be identical with a condition called Bubon de Velez, which is supposed to be confined to the province of Velez in Colombia. Dr. PAEZ shewed me cases of malarial splenomegaly and blackwater fever. There is a fine field for work in Ciudad Bolivar.

As I have mentioned South American malaria, I would remind you of the well-known fact that in Brazil and elsewhere, there is a quinine resistant strain of plasmodium. ZIEMANN thinks that this is the result of the malaria-stricken population having for a great number of years been saturated with quinine, to the action of which the parasites have acquired a tolerance. He thinks it would be a great matter to find a safe and easily administered drug which might take the place of quinine. Such a drug may, I think, possibly be forthcoming from *Nectandræ cortex*, or Bebeeru bark, derived from *Nectandra rodœi*, the greenheart tree of British Guiana, which belongs to the Lauracea. It was used long ago in cases of ague, and often with success, but at times it appeared to fail, and fell into disuse. Considering our more exact methods of testing drugs, both clinically and chemically, and our improved knowledge of tropical fevers, it seems to me it merits further investigation, and

I am arranging for this to be conducted. The cattle trade of the Orinoco is a big business, and interesting from the veterinary standpoint. The quarantine station and splendid slaughter-house at Port of Spain testify to its importance.

We must, however, again get under weigh, run out through the northern Bocas, once traversed by the immortal Nelson and his battleships, touch at that unsavoury and unhealthy spot Carupano, famous only for its superb rum, look in at Margarita Island with its pearl fisheries, and then attain the mainland, creeping under the shadow of that huge Sierra which rises well nigh sheer from the rim of the Caribbean, and recalls the great sea captain, Amyas Leigh, and the romance of *Westward Ho!* There is not much romance about the modern La Guiara, a terribly hot, dusty and dirty place. Macuto, the Brighton of Caracas, a little farther east is distinctly better, but one is thankful to speed up into the clouds upon the wonderful mountain railway which is under the direction of an able and genial Scot, much interested in questions of snakes, scorpions, and medicinal plants. Three thousand feet nearer heaven we find the remarkable university city of Caracas, aptly described as "a capital of beautiful prospects and beautiful women." Here, however, we are concerned with Caracas from the medical and sanitary standpoint.

Dr. CAPRILES, Director of Civil Hospitals, proved a capable and kind guide to things clinical. Under his auspices I visited the Hospital Vargas, of which I shew you pictures, together with one of a fine monument to Dr. VARGAS *(fig. 11)*, the father of Venezuelan medicine. I would, however, remind you that a greater medical name than that of VARGAS is associated with Venezuela, for in that country lived and, I believe, died the far-seeing BEAUPURTHUY, a prophet as well as a priest of the goddess Hygeia. I learned, what I did not know before, that he finally devoted himself to the study of leprosy, contracted that disease, and fell a victim to it at Cumana. If this is so, how comes it that Dr. SAMBON was able to give me the photograph of his grave *(fig. 12)* from which the lantern slide I shew you was prepared? The grave is in the Penal Settlement Cemetery, Mazaruni river, British Guiana. Was his body transferred there for burial?

He would doubtless have been glad to witness the quickening of the interest taken in sanitary matters at Caracas. There was, and is,

urgent need for it. The principal hotel, under German management be it noted, is best described as a mouldy place where the food predisposes to colic and the stair carpets might have done duty in Noah's ark. The climate of Caracas is well-nigh perfect, its site is superb. No one should die there except from old age. Unfortunately there is a very different tale to tell, simply because the authorities have in the past neglected to carry out proper sanitary measures. I have not time to go into details, but would draw attention to the peon filling water barrels from a stream! It is not, however, water which is going into those barrels, it is diluted sewage. The stream is the Guiare river, into which a great part of the sewage of Caracas runs, and the bare-legged gentleman in the stream is obtaining his supplies well below the city and the outfall.

You, doubtless, suppose that the barrel contents are to be used for agricultural purposes. Not at all. They are for watering the terribly dusty main road running out of the city to the east, a road with much motor traffic upon it. Is it any wonder enteric fever is rife in Caracas, and all diarrhœal diseases common? Yellow fever used to be frequent, but I am glad to say is now being fought, and well fought, with gratifying results. So is ankylostomiasis, and here and in Colombia they largely use higueron, the sap of *Ficus laurifolia*, a well-known anthelmintic, said to act like a charm in trichocephaliasis. If all that is claimed for this drug be true, it is time it came into more general use. At present the latex is taken mixed with coffee. It is believed an alkaloid is present in the sap. If this can be isolated a valuable preparation may be forthcoming to take the place of thymol and beta-naphthol. Time will shew.

A few years ago Venezuela celebrated the centenary of her independence. Most of the foreign powers presented gifts. Great Britain did not, possibly because it was thought that we had given enough in the form of the famous 6,000 British legionaries, those superb veterans from the Peninsula and Waterloo, who played so great a part in freeing both Venezuela and Colombia from the Spanish yoke, and about whom precious few people in this country know anything at all. Note what Germany did! She presented a very fine and complete laboratory equipment for hygienic work. I have seen it and can testify to its excellence. What a pity it is that the German race, which has un-

doubtedly done much to further science and the welfare of mankind, has now constituted itself a scourge and a menace! We shall see it playing a different rôle in Colombia.

In the new laboratory reigns Dr. GONZALEZ RINCONES, so well known for his entomological work. I found him engaged upon the fascinating problem of how and why the Janthinosoma mosquito acts as a transporter of the eggs of *Dermatobia hominis*. To this mosquito the picturesque name "Aeroplane of the Macaw Worm" has been given, and apparently only the female is engaged in the transmission. Now how does the mosquito get the eggs from the fly plastered on to her abdomen? Does she pick them up haphazard, or are they carefully deposited by the mother Dermatobia? Thanks to Dr. GONZALEZ I am able to shew you not only a lantern slide of the mosquito, but the actual insect itself with the fly eggs *in situ (fig. 13)*. I believe this is the only specimen in England, so pray be careful of it! In the private laboratory of Dr. ITURBE, I saw locusts being killed by the *Cocco-bacillus acridiorum* of Hérelle, a most interesting and hopeful sight. It has recently been employed by BÉQUET with some success in Algeria. I cannot take farewell of Caracas without expressing my great indebtedness to Mr. HARFORD, C.V.O., the British Minister, and to Dr. GUEVARA ROJAS. both of whom smoothed the way for me on manifold occasions.

From Caracas, accompanied by Dr. CAPRILES, I journeyed in a motor car to the Lake of Valencia, 70 miles to the west, a thing I hope never to do again. The scenery was admirable, the road very much the reverse, inches—I had almost said yards—deep in sand in many places, seamed by huge ruts—I had almost said dongas—and, in places, of an amazing steepness, and with terrifying curves. I now feel rather proud that I did not take the train back; at the time, and for some days subsequently, I felt I had been a fool. When in the rear of herds of Andean cattle, one was smothered in foul dust. The driving was like that of Jehu the son of Nimshi, and as a result one flew from side to side like a parched pea in a pan, was driven violently upwards from the seat, was thrown as violently forwards, and was eventually, holding fast by a rail, forced to balance oneself in the air between earth and heaven, like the coffin of Mahomet.

All's well that ends well, however, and I shew you some pictures taken *en route*.

The Lake of Valencia presents a problem. It has no outlet; twenty-two rivers run into it, and yet it is slowly drying up. We notice here the abundance of aquatic growth closely resembling the sudd of the Upper Nile. Malaria, of a very severe type, is prevalent along the shores of this lake. The little posada at Maracay, where I stayed, was alive with mosquitoes, nearly all Culices.

In order to reach Colombia it was necessary to go to the Dutch island of Curaçao. I went there from La Guaira in an abominable Norwegian tramp steamer flying the American flag. It also took me to Maracaibo. Curaçao is not the least like the usual West Indian island. Its general aspect and some of its flora strongly suggest Africa. It might almost be a chip of the veldt transported to the Caribbean. This being so, I was not very much surprised to come across a flourishing ostrich farm, with a stolid Egyptian fellah looking after the birds. The capital is like a little town in Holland. I spent a long time trying to find a dirty place in it. I discovered one at last, in the neighbourhood of negro cabins on the slope of a hill, but even this dumping ground was not very bad. Everything was too dry for great offence to result. The narrow harbour, widening out into a wonderful lagoon, suggests pirates, and, indeed, there is still an old pirate house upon one of the wharves. One of the principal diseases in the island is diabetes. It seems that this may be due to the fact that Jews form a large proportion of the better-class population, and this race is known to be specially liable to diabetes. Nephritis and erysipelas are also said to be common. Curaçao, with all its virtues, scarcely suggests tropical research. It is too much of a health resort. The same cannot be said of Maracaibo, at the entrance to the huge gulf of that name—a curious little city, a fine business centre, hence full of Germans, and visited periodically by yellow fever. Forty cases cropped up shortly after I had left it. Dr. Coates Cole is a leader in the local medical life here, and holds quite a unique position. He has had great experience of severe malaria, which, let it be noted, he invariably treats by intramuscular quinine injections, and of yellow fever, in which he finds a French antipyretic—cryogenin—of great service. You will be glad to know that it is meta-benzamine semi-carbazide.

He took me to the leper settlement on Providencia Island, a truly horrible place. Picture wretched people without any faces at all,

others with faces like nothing human, miserable, deformed creatures, and, alas! little patients, some just beginning to develop the disease, for the healthy children born of leper parents are not removed from the lazarette but are allowed to take their chance. White, black and yellow inmates of both sexes and all ages, there they are, wonderfully cheery in what looks like misery and wretchedness, while out in the yards the lean black vultures strut and peck. It reminded one of Kipling's Indian lepers and the crows. I have never seen so depressing a place, and yet the patients are well enough fed and, for the most part, do not seem unhappy. A few do well under energetic treatment with refined Chaulmoogra oil; the majority are doomed. The wards were ill-kept and dirty, but the devotion of the nurses is beyond all praise.

Returning to Curaçao upon the ancient tramp, I succeeded eventually in catching an Italian steamer which landed me upon the long pier at Porto Colombia. Thence I journeyed to Baranquilla, a fairly prosperous but unfinished looking town, which need not detain us. *Stegomyia fasciata* was said not to occur in the place, but I caught one the only night I was in it.

There is a saying that it is about as easy to get to Bogota as to heaven. It may be so; certainly it is a long journey from the coast to the Colombian capital, and the worst of it is one never knows how long it will take. It may be ten days, it may be a month or more. It all depends on whether your steamer sticks fast on a sandbank or not. The Magdalena is a great and noble river, but no one can say what it will do next in the way of shifting its navigable channels. The journey took me sixteen days, but I stopped for three of them at Mariquita, in the province of Tolima, the guest of the hospitable Manager of the La Dorada Extension Railway, Mr. Thomas Millar.

I would like to describe the river life, the strange food, the caimans and turtles on the sand spits, the gorgeous macaws speeding across the huge water stretch, the noisy parrots, the black monkeys in the tree tops, but considerations of space forbid. The forests are truly wonderful, but well-nigh impenetrable. The bird and insect life is fascinating, but of larger wild mammals one sees next to nothing. The heat at times was almost unbearable, and the climate is undoubtedly very trying to Europeans. Scorpions come on board the

steamers with the wood fuel. When a member of the crew is stung and has succeeded in catching the aggressor, he splits the latter open and applies its internal organs to the puncture, with, it is said, beneficial results. This is something like the custom of swallowing a snake's gall bladder in the case of a snake bite.

Among the biting flies which I collected was probably a new Simulium, now in the hands of Dr. KNAB. I chased a Lepidoselaga half the morning and failed to capture it; a spider, however, succeeded where I failed, and eventually I took both locked in an embrace which could scarcely be called a loving one. The two blood-suckers are upon exhibit.

Honda, an interesting old town, has a reputation as a good place for phthisical folk. I found quite a little colony of recovered Welshmen there, men sent out almost in a dying condition, but now doing useful work.

From Mariquita, on a plateau of the same name, a magnificent view of the Andes can be obtained. Through it courses the Guali River, coming from a region of gold mines. It is said that the red, clay-stained and sewage-polluted waters of this river cause, or rather caused, goitre, which is common in the district. When another source of supply became available, it is asserted that the goitre decreased. This is interesting in the light of MCGARRISON'S views on the subject, as is the statement that in the province of Antioquia, to which I shall presently introduce you, goitre is comparatively rare, owing to the fact that the Antioquian waters contain iodine. Certainly in Colombia the goitre problem might be tackled with advantage. The disease is more common in women. Under the flanges of the rails on the La Dorada Extension Railway, running from La Dorada through Mariquita to Ambalema on the Upper Magdalena, above the rapids, I found many so-called "Cojo" spiders, brilliant creatures with bright red globular abdomens spotted with black markings. They belong to the genus *Lathrodectus*, and are said to be very venomous. I was credibly informed that a bite from one of them had proved fatal within twenty-four hours in the case of a healthy railway peon, but I fancy their deadliness is somewhat exaggerated, though typical specimens of this genus are undoubtedly poisonous.

On the way to Ambalema one was pestered by tiny Hippelates flies, which constituted themselves a nuisance.

Another steamer journey brought one to Girardot, and there the hotel had a notice priding itself on its excellent sanitary condition. In order to impress this upon the visitor, there was a large earthenware bowl full of water and sunk into the soil in the patio, and the water was simply alive with culex and stegomyia larvæ. I would like to have fined the proprietor. All I could do was to deliver a mild lecture in execrable Spanish and to see the bowl baled dry.

From Girardot one climbs into the clouds by a mountain railway, reaching at one place an altitude of 10,000 feet above sea level. The sudden change from intense and steamy heat to the chill air of the Upper Andean slopes undoubtedly predisposes to bowel troubles. I have little doubt that the consequent diarrhœa is analogous to the well-known hill diarrhœa of India. The famous Sabana, a great and lofty plateau, is reached at last, and after changing trains at Facatativa, a short journey across a level stretch, reminiscent of the Lombardy plain, brings one to the quaint and comparatively venerable city of Bogotá, nestling on the lower flanks and at the base of the huge twin buttresses of Monserrate and Guadalupe. Here there is a School of Medicine, and considerable activity in sanitary work. A graduate of Harvard, and a Fellow of this Society, Dr. José Montoya, constituted himself my guide, philosopher, and friend, and under his auspices I visited the hospitals, and saw what I could in the way of tropical medicine. There are plenty of cases, many coming from the unhealthy Llanos to the south. They find their way, these poor peons, into the San Juan de Dios Hospital. Doubtless the conditions there are an improvement upon those in their own poverty-stricken dwellings, but there is no use in concealing the fact that in certain respects this large and ancient hospital is about a hundred years behind the times. The reason is not far to seek, though this is not the place to discuss it. Let it be said, however, that it is not the fault of the enlightened little party of medical men who are struggling to remedy conditions which are a blot on the escutcheon of the capital.

This hospital, which I gather is always overcrowded, dates back to 1770. In one of its courtyards stands the dissecting-room of the medical school, recalling conditions, aye and producing conditions, once obtaining in Vienna. In another I found the washing out to dry, and promptly photographed it. The tiles covering the roof of the

wash-house were of the most wonderful tints, vermilion, violet, blue, golden, richest umber, and metallic green. One of the ambulances is a Sedan chair. I saw a patient being brought to the hospital in it, and I hope it will soon be on view in the Historical Medical Museum. Patients lay in rows upon the floor of the wards. All kinds of cases were mixed up together, owing to lack of space, and despite the protests of the medical staff. One saw a victim of ankylostomiasis bloated with œdema, and hard by a wasted dysentery case straining in his misery. Enterics were dotted here and there, and altogether this hospital came somewhat as a shock. It is, however, only fair to say that, thanks to the energy and influence of Dr. MONTOYA and some of his friends, an excellent children's hospital has been erected. The fabric of a new hospital is also under construction, and though money is wofully scarce we may yet hope to see a building worthy of Bogota and of its Medical School. To the staff of that School I shall always be indebted for their courtesy and abundant hospitality, while I am under many obligations to the British Legation and its Secretary, Mr. EDGAR BOWLE.

Here are two photographs of interesting cases *(figs. 14 and 15)*. I am certain they are examples of the condition known as gangosa. Now, what is gangosa? Is it a disease *sui generis*, or is it the result of yaws? At Bogotá they did not recognise the condition, and I believe these are the first cases to be recorded from Colombia proper. I understand a single case has been reported from Panama. Gangosa is another problem worthy of investigation. We will revert to it again when we reach Jamaica.

Thanks largely to Mr. WYNDHAM, the British Minister, I was able to see a good deal of Bogotá, and especially of its sanitary problems. The water supply might be better; the sewage disposal might be very much better; the milk supply is open to criticism, as when one finds a donkey with a milk-can on one side of it and a barrel for hog-wash on the other! *(Plate 4, fig. 16.)* At the same time, many of the streets are well paved with asphalt and the city is making progress. It is interesting to see the Padilla spring-water being sold in the street; strings of fish from the Magdalena being carried upon a pole; and to visit the market, which is much more primitive than that of Caracas. Bogotá itself, however, cannot be called a tropical city. It is 9000 feet

above sea level, and its climate is temperate, indeed, at times, distinctly cold and rainy. One gets a good idea of the situation by riding out to the verge of the Sabana, where the famous falls of Tequendama, thrice the height of Niagara, fall sheer in spray and thunder from the edge of the plateau to a valley bottom far below *(figs. 17 and 18)*.

At this spot one finds the warm air from the lower slopes meeting the chill breath of the Sabana and condensing to form those mists of which I am able to shew you a picture. Standing thus at a great altitude, and looking out upon the Andes, we may take a medical survey of Colombia as a whole, and so I exhibit some slides illustrating the distribution of certain of the more important diseases. Professor URIBE very kindly had the maps prepared for me. Here also is the one I promised depicting the rôle of the Teuton; German officers training the Colombian army. Observe the goose-step as practised in the Andes!

I returned to the Magdalena valley, and consequently to the tropics, by the old Spanish road which runs from Facatativa to Honda. Few who have not seen it can have any idea of what it is like; paved in parts; in parts like the bed of a mountain torrent; of an amazing steepness; of an astonishing miriness once the rains have begun, as they had when I essayed it; commanding every now and then the most superb prospects—the giant snow-clad peak of Tolima soaring to 18,320 feet, the long glistening range of Ruiz, the wonderful river valley lying below one like a gigantic relief map. Mule trains still traverse the road, as I now shew you, and until recently every grand piano in Bogotá, let alone minor pieces of furniture, ascended it. Is it any wonder that for animals it is a *via dolorosa*, a highway strewn with bones?

In the primitive posadas *en route* one is apt to become infected with the spirochæte of relapsing fever, and the belief is firmly held that bed bugs are to blame. Fleas are much more in evidence than bed bugs, and here is a problem requiring solution. In some parts of Colombia a tick, *Ornithodorus turicata*, is known to be the carrier.

My objective now was the Rio Atrato towards the setting sun, so I left the Magdalena at Puerto Berrio, a terribly unhealthy spot. I will not readily forget an episode near this dreary village of vultures. There being no road of any kind leading away from the town, I had gone for a walk along the railway track and was returning, sweating at

every pore, when I saw two peons carrying between them a box slung from a pole. A person in some kind of uniform accompanied them. He was a policeman. As I passed I saw the box was open, and with somewhat of a start realised its nature. Within it, with jaw tied up, with malar bones protruding, with yellow sunken cheeks, lay what had been a man the night before. The very look of him suggested the cause of death. I enquired of the policeman and learned that dysentery had killed him. "Yes," said the official stolidly, "they are always dying here; they die like dogs and are buried like dogs." Is not this sad, with emetine upon the market? There is, however, neither an hospital nor a doctor at Puerto Berrio, although it has a certain importance and marks the beginning of the railway to Medellin, capital of the Province of Antioquia. There is a gap in the railway, and one rides or drives from station to station. Dr. HENAO, who is in medical charge of the railway itself, is, however, very energetic, and keenly interested in tropical medicine and hygiene.

In the region near Puerto Berrio various species of Conorhinus bugs are found, and it is possible that CHAGAS'S disease exists. At Medellin I was shewn a supposed case in a boy of twelve. He was not in a febrile state, so it was no use examining his peripheral blood. I never saw such a mountain of œdema, and personally I am inclined to think he may have been an example of that curious form of nephritis in the young, which was afterwards demonstrated to me at Panama.

Medellin is a very pleasing place, unhappily and quite unnecessarily scourged by enteric. In the hospital here I saw an amazing number of undiagnosed ulcers, chiefly of the legs. There is a fine field for research in this direction. At Medellin I made arrangements for the long journey on mule back across three Cordilleras, across the mighty Cauca river, across lofty and rain-swept paramos, and finally through the dense forests of the Choco to the Rio Atrato.

This was certainly the most interesting part of my journey, and I traversed a region little known either to Europeans or to the Colombians themselves. It was only owing to the kindness of Mr. BADIAN, the British Vice-Consul at Medellin, and of Señor DON CARLOS RESTREPO, a well-known Antioquian, that I was able to get proper information and secure a reliable guide.

I started from the town of Caldas, a picturesque place full of fleas, and

journeyed by Amaga and El Provenil to the Cauca valley. The trail wound along bleak mountain flanks, descended into green hollows full of feathery bamboos and singing birds, crossed considerable streams, and, in places, was distinctly dangerous, more especially when one encountered long trains of mules bearing huge planks cut and shaped in the Andean forests. It was the reverse of pleasant to meet such potential battering-rams at a sharp angle, with a river brawling one thousand feet below, and the mountain side towering like a cliff above one.

In the Cauca region, pinta of every kind and colour is exceedingly common. It is said that one species of revenge which is practised is to give your enemy pinta through contact or infected clothes. I saw several cases of the red and black varieties of this intractable disease. The Cauca, a very fine river, is crossed by ferry, and from there onwards the journey is sufficiently arduous until the upper waters of the Penderisco and the savannah of Urrao in the San Isabella valley are reached.

In the coffee country near Concordia I took several rare Tabanidæ, and I killed a species of coral snake on the savannah. Urrao is an interesting upland town, or rather a church with a town attached, for the new place of worship dominates the landscape. The surrounding scenery reminded me of bits of the Clyde valley. It is a great cattle country. Redwater occurs but is not very prevalent, and ticks abound. In the Pavon valley pellagra is common. Maize is the staple food, but it is said to be of good quality. Here are running streams, and Simuliidæ almost certainly occur, though my search for larvæ was futile.

At Urrao I saw a case of very acute and violent mania in a pellagrin. Sanitary conditions are well-nigh non-existent, and as a result enteric takes toll of the inhabitants. Everywhere it is the same story—flies, filth, and disease.

The rainy season now began in earnest, and from near Urrao onwards I rode in drenching rain for the most part. One climbed, and better climbed, amongst the greyish-green Andean forests, very still and apparently lifeless, till the Paramo of Sumbacula was reached, in a region of extinct volcanoes. Tabanidæ swarmed upon the road whenever the rain ceased, and I reaped a rich harvest. As will be seen, these mountain Tabanidæ differ from those taken in the Atrato valley.

From the Paramo aforesaid one descended for a whole day, shrouded in mists and vapour, by a very rough, primitive, precipitous track to the

roaring torrent of the Ocaidocito, above which, upon a covered bridge, one spent the night in fair comfort, shrouded in mosquito curtains. Thereafter it was a case of struggling along a muddy and flooded forest path, now through long soaking grass, anon cutting a way with the macheté through tangled bush or dense plantain and rubber groves, meeting with wild and naked Indians, fat and comely folk of a rich bronze colour, decorated with beads and very pleased to get a few cigarettes; plunging through rapid and rather perilous rivers full of deep pot holes and swollen like the Spey in spate; catching Tabanids and Chrysops and Dichelacera when ever the sun shone for a space and cheered one up; and sleeping in empty, leaky huts, until at last we halted at Charicha on the banks of the Arquia.

It is to be noted that while the Tabanids attack the fetlocks of an equine, the Chrysops are nearly always to be found about the neck or withers.

From Charicha I descended the Arquia by canoe to its junction with the Atrato, a vast and deep river fringed by the densest tropical growth. There, thanks to the kindness of a Syrian gentleman hailing from Egypt, I was given a room to serve as a laboratory. Unhappily it rained well nigh all day and every day. The river rose and the place became a veritable swamp. There was practically no dry land on which to walk, save for a path along the side of the Arquia. Hence I had to be content with catching flies and mosquitoes, which abounded, and with making a few blood examinations.

The population is wholly negroid, riddled with syphilis, poverty-stricken and superstitious. I found a case of old nasal myiasis in a negro. It appeared that he had been cured by the use of liquid creasote, originally intended for treating cracks in calves' hoofs. Anyhow, I washed out his nose thoroughly with a mixture of milk and chloroform, but was unable to expel any larvæ. In his blood, however, I found a sharp-tailed filarial embryo, which I recognised as *Microfilaria demarquayi*. This is a new locality for this nematode. The infection was fairly heavy.

The quaint toucans, with their huge yellow bills, are common at the Boca de Arquia, and it is perhaps interesting to note that they swarm with lice, which Mr. GUY MARSHALL informs me belong to the genus Menopon.

Far up the Atrato the Indians obtain a poison for their blowpipe arrows from the venom of a small yellow toad about two inches in length. The venom is procured by hanging the hapless amphibian over a slow fire, when the gland fluid collects upon its cuticle. I was told that a dart thus poisoned caused slight local swelling and rapid death from paralysis. FAUST, of Strasburg, as you probably know, has demonstrated the highly toxic properties of the venom of several species of toad, so I have no reason to disbelieve this story.

After a week in this forsaken solitude, the ancient paddle-steamer passed up river on her way to Quibdo, the capital of the Choco country, some sixty miles south of the Arquia, and with a very evil reputation as regards disease. Malaria and blackwater fever are both rampant.

I embarked on the venerable "Santa Barbara" upon her return, and voyaged to the mouth of the Atrato through a wild forest land, full of egret-haunted swamps and lagoons, the home of the jaguar, the puma and the tapir, and peopled by Indians and negroes. On either hand, far back, were tree-covered slopes and hill ranges; those on the west separating the Atrato from the waters of the Pacific. Towards the mouth of the river I saw many howling monkeys amongst the bushes. Crossing the Gulf of Darien, we reached Turbo, another unhealthy place, and then, with some trepidation, splashed out to the open sea at three miles an hour. Far away we could mark the spot where the unfortunate Scottish colony came to a miserable end, largely through lack of the information which now we happily possess, and unhappily so rarely apply in a proper manner.

Touching at Zapote, where the Sinnu river pours a huge volume of water into the Gulf of Morrosquilla, we came finally to the historic Cartagena. Then, on another steamer, calling at the great banana port of Santa Marta, and remembering that banana bunches often harbour rats, I found myself one morning passing over the spot where lie the bones of Francis Drake, and shortly thereafter I was at Colon.

Dr. MALCOLM WATSON dealt so fully with the Canal Zone that it is not necessary to repeat what has been said, and, in any case, Panama no longer possesses the sanitary interest which was such a feature of the excavation days. Still, there is much to be learned at Ancon Hospital, where Dr. DARLING, Dr. CONNOR, Dr. JAMES, and others with well-known names, take every trouble not only to give you a good time, but to see

that you become familiar with their laboratories *(fig. 19)*, wards and cases. Dr. DARLING has solved most of the Panamian problems, but a few remain. I saw one case, which was said to be an example of mossy foot, under the care of Dr. CALDWELL in Panama City *(Plate 5, fig. 20)*. The cause of mossy foot is still unknown. The condition is not mycetoma, which it resembles. Look at this truly appalling wreck of an Indian youth of 28 years, the victim of untreated congenital syphilis! *(fig. 21.)* Dr. CALDWELL told me that on admission he was a huge scab. Salvarsan worked wonders, but it could not perform miracles, hence this bone absorption, these scars and deformities.

The nephritis of the young negro is a curious condition. Dr. DEEKS believes it is due to toxic absorption from the bowel, the result of carbohydrate fermentation, and gives his patients plenty of butcher's meat with, he assures me, excellent results.

It is truly wonderful what the Americans have done upon the Isthmus, but there are signs of slackening, as some of their doctors admit, and it is earnestly to be hoped that the sanitary banner will be kept flying for all time. It must not be forgotten that the French did a great deal also in the way of hospital construction, but they were too early upon the scene, and paid a dreadful penalty for ignorance.

Jamaica is surely one of the most beautiful spots on earth, and yet observe what occurs there! Here is a woman with a gaping hole where her nose should be, sightless optics, and a terrible scarring upon the neck and shoulder! All this is probably the result of yaws *(fig. 22)*.

Enteric is common in Kingston, and they are still worrying about the cause thereof. Is it water, is it privy-pits plus flies, is it a question of carriers and contact?

Then there is the vomiting sickness, a problem yet unsolved, despite the labours of Dr. HAROLD SCOTT, SEIDELIN, and others.

I found Major HARRISON investigating another problem, *i.e.*, the nature of the endemic neuritis of Jamaica, which is quite distinct from beri-beri, and in which the special senses are apt to be affected. Thanks to Dr. ERRINGTON KER I saw a good deal of the island, and many cases of disease, among them one of the cholecystitis, very closely simulating yellow fever. Why should a sturdy negro boy get rickets, and why, as Dr. WILLIAMS told me, do pellagrins in the asylum improve on a banana diet? Why, also, do patients *in* the asylum acquire pellagra? Has it

anything to do with the Ceratopogoninæ on the beach, or is the *Stomoxys calcitrans* at work? Dr. MACDONALD, now busy at ankylostomiasis prevention in Grenada, gave me an insight into his sanitary problems, before embarking on yet another steamer, and setting sail for the wonderful harbour of Santiago de Cuba. Thence a train takes one right up the middle of the Pearl of the Antilles. Under American influence sanitary measures are not lacking, as witness the small boy at Camaguay Station, with his sweet-stuffs shrouded in muslin *(fig. 23)*. AGRAMONTE and GUITERAS are names wherewith to conjure in the fine city of Havana, where I had the good fortune to see some cases of plague, happily for them, convalescent. I also visited the waterworks, which are one of the sanitary features of Cuba's capital.

Here, I think, we may call a halt, for we are practically out of the tropics, and between Havana and New York there remained only Nassau, in the outlying Bahamas. It is impossible with the space at my disposal to deal fully with everything that came under my notice during a tour that lasted six months.

I have only been able to give you a mere outline of my journey, but I think I have said enough to shew that these distant lands, so rich, for the most part, in their flora and fauna, are also, in many instances, rich in pathological problems, and in those conditions which destroy alike the white man and the black.

Happily most of them are preventable; unhappily many of them are not prevented. The means which should be taken to do so constitute the greatest problem of all, and yet very often it is a problem capable of comparatively easy and speedy solution. Much has doubtless been done where the British and American flags fly. At this time we remember, surely with sorrow and regret, how within a very short space of years 90,000 British troops perished in the West Indies, almost wholly from disease. An army disappeared. That could scarcely happen again, but even under the Union Jack there is need for a quickening of dry bones, for men to be up and doing, for sanitary progress, sanitary reform, and medical research. Still more is all this required in the two large Republics with which I have dealt, and which are countries of great potential wealth and of a very considerable importance in the world of commerce. The times are troublous. Peaceful Science no longer holds her sway, but when right and justice have eventually triumphed, as

assuredly they will, we may hope to see attention again directed to these lands of the west. We live in expectation of the day when mystery will yield to knowledge, and when knowledge will be applied, not for man's wanton destruction but for his comfort and salvation.

EXPLANATION OF PLATES.

PLATE No. 1.

Fig. 1. A pool near Hastings swamp, Barbados.
Fig. 2. "Poor White" children, Grenada.
Fig. 3. "Poor White" child, the victim of Ankylostomiasis.
Fig. 4. Tuberculosis Hospital, near St. George's, Grenada.
Fig. 5. Privy built over the sea, Gouyave, Grenada.

PLATE No. 2.

Fig. 6. Depigmentation in Hindu woman, Gouyave, Grenada. From a photograph by Dr. SAMBON.
Fig. 7. Albinism in a negro family, Grenada. From a photograph by Dr. MITCHELL, St. George's.
Fig. 8. Sanitary dustbin, Port of Spain, Trinidad.
Fig. 9. Net to guard neck and part of face from Stegomyia bites, Dr. GEORGE, Trinidad.

PLATE No. 3.

Fig. 10. Street scene in Ciudad Bolivar, shewing central channel with slop-waters and blocked grating.
Fig. 11. Statue of Dr. VARGAS, Hospital Vargas, Caracas, Venezuela.
Fig. 12. Grave of BEAUPURTHUY. From a photograph by Dr. SAMBON.
Fig. 13. Eggs of *Dermatobia hominis* on abdomen of *Janthinosoma lutzii*.
Fig. 14. Early case of Gangosa in a Colombian, Bogotá,
Fig. 15. Advanced case of Gangosa in a Colombian negro, Bogotá.

PLATE No. 4.

Fig. 16. Milk-can and hog-wash barrel on the same donkey at the door of an hotel in Bogotá.
Fig. 17. The Falls of Tequendama, free from mist.
Fig. 18. The Falls of Tequendama, shrouded by the mist formed by the cold air of the Sabana meeting the hot air rising from the *tierra caliente*.
Fig. 19. Dr. DARLING'S Laboratory, Ancon Hospital, Panama, Canal Zone.

PLATE No. 5.

Fig. 20. Case of Mossy Foot, Santo Tomas Hospital, Panama, R.P. From a photograph by Dr. CALDWELL.
Fig. 21. Case of Congenital Syphilis and Osteomalœia in a Panaman, aged 28 years, Santo Tomas Hospital, Panama, R.P. From a photograph by Dr. CALDWELL.
Fig. 22. Case of facial ulceration and scarring, possibly the result of Yaws, Kingston, Jamaica. The nasal cavity is covered by a dressing.
Fig. 23. Boy selling fly-protected sweetstuffs at Camaguay railway station, Cuba.

Fig. 1.

Fig. 3.

Fig. 4.

Fig. 2

Fig. 5.

Illustrations to accompany Dr. ANDREW BALFOUR'S Paper.

Fig. 6.

Fig. 7.

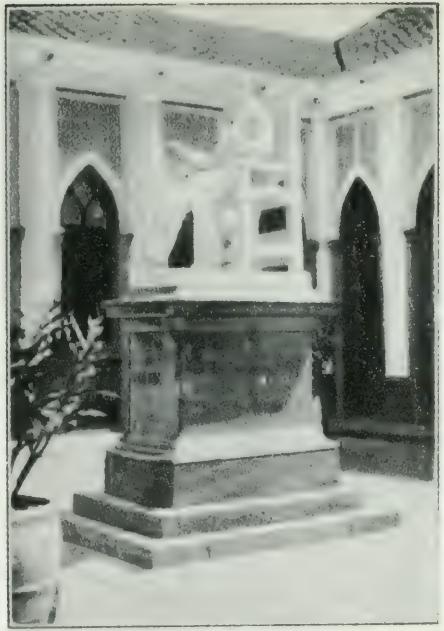
Fig. 8.

Fig. 9.

Illustrations to accompany Dr. ANDREW BALFOUR'S Paper.

PLATE 2.

Fig. 10.



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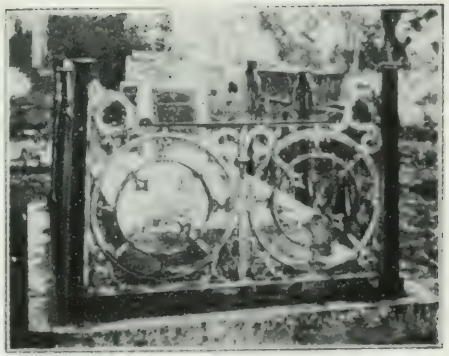

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

PLATE 3.

Fig. 16.

Fig. 19.

Fig. 17.

Fig. 18.

Illustrations to accompany Dr. ANDREW BALFOUR'S Paper.

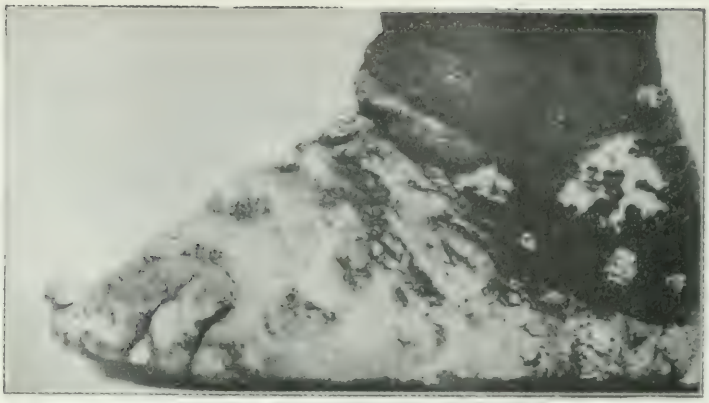

Fig. 20.

Fig. 21.

Fig. 22.

Fig. 23.

Illustrations to accompany Dr. ANDREW BALFOUR'S Paper.

Dr. D. E. Anderson: I should like to ask Dr. Balfour if he came across any cases of beriberi in Colombia?

Dr. A. Balfour: Yes, I did. Beriberi is quite common. There is a curious belief that it is due to drinking water contaminated by the decomposition of the wood of the ceiba, or silk-cotton, when the tree falls into the stream. Beriberi is also common in Venezuela. In Colombia it is very serious amongst workers at some of the mines.

Dr. D. E. Anderson: Did you see any cases of uta?

Dr. A. Balfour: No, I did not hear of it in Colombia?

Dr. D. E. Anderson: Any cases of gangosa?

Dr. A. Balfour: I have referred in my paper to two cases from Colombia of what appears to be gangosa.

Dr. D. E. Anderson: Certain authors say that gangosa exists in Colombia but not uta. I saw several cases of uta in Lima, but none in Cartagena and Baranquilla (in Colombia). Uta is often mistaken for gangosa, but according to Dr. Manuel Tamayo, of Peru, and other Spanish authorities, who have studied uta *in situ*, the two diseases, though resembling each other in many respects, differ from each other in the appearance of the early ulcers, and also as to the site of their origin. Uta begins as a pimple on the face; gangosa as one inside the mouth, as a rule on the palate or on the inner side of the cheek—in fact, on the mucous membrane. The deformities of feet and hands are more pronounced in gangosa than in uta.

It is very interesting to hear what you say about the so-called "Poor Whites." When I was in the West Indies last year I visited most of the British Colonies, and came across these "Poor Whites." There they mix in a friendly manner with the blacks at school and in their homes, but they are not received in the houses of the better class of white and black, and yet some of them can trace their ancestry to good European families. They are the descendants of passengers and sailors taken prisoners by the

Spaniards, and by the French and English pirates, and liberated or turned into slaves on those islands.

Dr. A. BALFOUR: I believe many of the "Poor Whites" of the West Indies are the descendants of the old Jacobites. After Sedgemoor, also, many of the prisoners were sent out and sold as slaves.

Sir RONALD ROSS: That remark about kala-azar not being present in the West Indies. The same thing holds good at Mauritius, where there are hundreds of thousands of coolies, and where no case has yet been reported. In Mauritius there is a very large medical staff, and they are very capable men, who have been constantly hunting for it. I searched, myself, about five years ago, but without success.

About the white population. There is in Mauritius a white population, which has remained there for some centuries and which is not degenerate in any way.

Dr. D. E. ANDERSON: There are few white families in Mauritius who are poor, and they are very different from the "Poor Whites" of the West Indies. In Mauritius they are the descendants of the first colonists of Louis XIV.'s time, and most of them members of noble families.

Dr. F. M. SANDWITH: I am perfectly certain that, although many of you are silent, I shall be voicing your sentiments by giving our very best thanks to Dr. BALFOUR for the great treat he has given us to-night. Amongst other things he has taught me at least, and possibly you, a lot of geography. He has sketched out some very interesting problems—clinical, pathological and bacteriological. It is interesting to see the extraordinarily good buildings provided for treating hospital people. It shews that many of the people in whose countries Dr. BALFOUR has travelled, appreciate the fact that certain sick individuals should be looked after; but the general sanitation which is so near the hearts of the Fellows of this Society is almost entirely neglected. The country is beautiful, and only man is vile. That, of course, one sees in many foreign parts, even in Europe; beautiful hospitals but an entire absence of hygiene outside them.

NOTICE OF MEETING.

SESSION 1914-15.

The next meeting of the Society will be held at 11, Chandos Street, Cavendish Square, W., at 8.30 p.m., on Friday, February 19th, 1915, when Professor W. J. SIMPSON will read a Paper, entitled "The War and Cholera."

ELECTION OF FELLOWS.

The following were duly elected Fellows of the Society :—

GERALD HUGH GALLAHER, L.R.C.P. & S.I., Lagos.

Major ARTHUR HUNT SAFFORD, R.A.M.C., London.

EXCHANGES.

Anales de la Academia de Ciencias Medicas Fisicas y Naturales de la Habana.

Annali di Medicina Navale e Coloniale.

Archives de l'Institut Pasteur Tunis.

Arquivos do Instituto Bacteriologico Camara Pestana.

Bulletin Public Health and Marine Hospital Service of the U.S.

Bulletin of the Tropical Diseases Bureau.

Bulletin de la Société de Pathologie Exotique.

Bulletin de la Société Portuguaise des Sciences Naturelles.

Bulletin de l'Academie Royale de Médecine de Belgique.

het Geneeskundig tydschrift voor Nederlandsch-Indie.

Indian Journal of Medical Research.

Johns Hopkins Hospital Bulletin.

Journal of Tropical Medicine and Hygiene.

Journal of Tropical Veterinary Science.

L'Enseignement Medico Mutuel Internationale.

Memorias do Instituto Oswaldo Cruz.

Philippine Journal of Science.

Revue de Médecine et d'Hygiene Tropicales.

Sanidad y Beneficencia.

The American Journal of Tropical Diseases and Preventive Medicine.

Veterinary News.

Yellow Fever Bureau Bulletin.

NOTE.—The above publications lie in the Society's room at 11, Chandos Street, W., and are at the disposal of Fellows.

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